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JB3-0112

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55-5-27864

U. S. NAVAL PROVING GROUND  
DAHLGREN, VIRGINIA

12313

208900

REPORT NO. 968

FRAGMENTATION OF PROJECTILES AND WARHEADS

18th Partial Report

STATIC FRAGMENTATION OF  
BRANDT 120mm MORTAR AMMUNITION

FINAL Report

Task

Assignment NPG-Re2c-35-1-52

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NPG REPORT NO. 968

Static Fragmentation of Brandt 120mm Mortar Ammunition

PART A

SYNOPSIS

1. This test was conducted to determine the fragmentation characteristics of Light and Heavy Brandt 120mm mortar ammunition.
2. The fragmentation characteristics of the Light and Heavy 120mm Brandt Mortars were as follows:

	<u>Light</u>	<u>Heavy</u>
No. Hits in total polar zone 50° - 140°	873	1340
Median Fragment Velocity (ft/sec) in polar zone 80° - 110°	3930	4900
No. Head Fragments in weight Groups:		
5/8 - 2 1/2 grams	768	1236
2 1/2 - 10 grams	564	715
10 - 40 grams	237	188
40 - 160 grams	7	29

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

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**Static Fragmentation of Brandt 120mm Mortar Ammunition**

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**PART B**

**INTRODUCTION**

**1. AUTHORITY:**

This test was authorized by reference (a) and conducted under Task Assignment NPG-Re2c-35-1-52, reference (b).

**2. REFERENCES:**

- a. BUORD Conf ltr NP9 Re2c-HRK:bac Ser 28034 of 7 Nov 1951
- b. BUORD Conf ltr NP9 Re2c-HRK:saw Ser 23964 of 4 Aug 1951
- c. CMC Restr ltr 40-11-mlb to BUORD of 23 July 1951
- d. Picatinny Arsenal Restr Report Serial No. 1823 of 14 Aug 1951

**3. BACKGROUND:**

The Commandant of the Marine Corps requested the Bureau of Ordnance in reference (c) to give standard Navy tests for storage compatibility, handling, shipment, and fragmentation of Brandt 120mm mortar ammunition. Reference (a) requested the Proving Ground to determine the fragmentation characteristics of light and heavy Brandt 120mm mortar ammunition.

**4. OBJECT OF TEST:**

This test was conducted to determine the fragmentation characteristics of light and heavy Brandt 120mm mortar ammunition.

**5. PERIOD OF TEST:**

- |   |                  |
|---|------------------|
| a. Date Project Letter                  | 7 November 1951  |
| b. Date All Necessary Material Received | 3 January 1952   |
| c. Date Commenced Test                  | 8 January 1952   |
| d. Test Completed                       | 18 February 1952 |

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## Static Fragmentation of brandt 120mm Mortar Ammunition

PART CDETAILS OF TEST

## 6. DESCRIPTION OF ITEMS UNDER TEST:

Two types of Brandt 120mm Mortars, light and heavy, were tested. Reference (d) contained examination data of both types which were obtained by Picatinny Arsenal. Some of these data are included in the following descriptions.

## a. Light Mortar

	<u>Approx. Wt. and Dimensions</u>
Empty shell, w/o Fin Assembly	18.9 lbs.
Nose Fuze, modified at NOL	.4 lbs.
Fin Assembly (empty)	3.2 lbs.
*Explosive Load	5.9 lbs.
Total Weight before fragmentation	28.4 lbs.
Length of Shell with adapter	16.15 inches
Diameter at Bourrelet	4.682 inches
Wall thickness at forward bourrelet	0.478 inches
Wall thickness 1" forward of base cavity	0.329 inches

## b. Heavy Mortar

	<u>Approx. Wt. and Dimensions</u>
Empty shell, w/o Fin Assembly	24.0 lbs.
Nose Fuze, modified at NOL	.4 lbs.
Fin Assembly (empty)	3.2 lbs.
*Explosive Load	9.7 lbs.
Total weight before fragmentation	37.3 lbs.
Length of shell with adapter	21.91 inches
Diameter at Bourrelet	4.684 inches
Wall thickness at forward bourrelet	0.381 inches
Wall thickness 1" forward of base cavity	0.244 inches

\* The explosive loads of these mortars were as follows:

<u>Charge</u>	<u>Explosive</u>	<u>Weight (lbs)</u>	
		<u>Light</u>	<u>Heavy</u>
Booster	Picric Acid	.04	.05
Core	TNT	.23	1.12
Bursting	TNT	5.68	8.54
Total explosive charge weight:		5.95	9.71

## Static Fragmentation of Brandt 120mm Mortar Ammunition

All mortars detonated in these tests were with empty fin assemblies. All fuzes were combination point detonating or delay, Type V18-1-R, and were modified by the Naval Ordnance Laboratory for static detonation. Photographs of these mortars are shown in Figures 1, 2, and 3.

## 7. PROCEDURE:

a. Space distribution data were obtained in a 30' radius semi-circular space distribution arena having 1/8" mild steel panels 5' high, marked off into 5° polar angle zones about the axis of the mortar with the nose pointing toward 0°. Complete penetrations of the panels were recorded.

b. Fragment velocity determinations were obtained by the usual high speed photographic technique in a 30 foot radius arena. The camera used was a 35mm Fastax. Fragment velocities obtained are the mean velocities over the first thirty feet of travel of beam spray (polar angle 80° - 110°) fragments.

c. The determination of fragment mass distribution was conducted in a sawdust-filled chamber. Each mortar was supported on its side in a cane fiberboard box. After each detonation, the sawdust was sifted and the fragments collected with the tail (fin) assembly fragments and the fuze fragments separated and classified separately from the mortar body fragments.

d. The forty rounds of mortars were fired as follows:

<u>Mortar Type</u>	<u>No. of Rounds</u>		
	<u>Mass</u>	<u>Space</u>	<u>Velocity</u>
Heavy	5	9	6
Light	5	9	6

## Static Fragmentation of Brandt 120mm Mortar Ammunition

## 8. RESULTS AND DISCUSSION:

## a. Space Distribution:

Detailed space distribution data are listed in Tables I and II and the nine (9) round average of fragment hits per total zones are summarized as follows:

<u>Polar Zone</u>	<u>Light Mortar</u>	<u>Heavy Mortar</u>
0°-50°	4	8
50°-90°	232	293
90°-110°	590	928
110°-140°	51	119
140°-180°	<u>0</u>	<u>0</u>
Totals (0°-180°)	877	1348

The heavy 120mm mortar produced an average of approximately 50% more fragment hits than the light mortar.

## b. Fragment Velocity:

Detailed fragment velocity data are listed in Tables III and IV and are summarized as follows:

<u>Mortar Type</u>	<u>6 Rd. Average Median Fragment Velocity Polar Angle Zone (80°-110°)</u>
Light	3930 ft./sec.
Heavy	4900 ft./sec.

The average median fragment velocity of the heavy 120mm mortar was approximately 25% higher than that of the light 120mm mortar.

## Static Fragmentation of Brandt 120mm Mortar Ammunition

## c. Mass Distribution:

Detailed fragment mass distribution data are listed in Tables V and VI and photographs of each round are shown in Figures 4 to 13 inclusive. The data are summarized as follows.

<u>Mortar Type</u>	<u>Average Number of Fragments</u>					
	<u>5 Rd. 5/8-2 1/2 grams</u>	<u>2 1/2-10 grams</u>	<u>10-40 grams</u>	<u>40-160 grams</u>	<u>160-640 grams</u>	<u>640+ grams</u>
Light	768	564	237	7	0	0
heavy	1236	715	183	29	1	0

Part DCONCLUSIONS

9. The fragmentation characteristics of the Light and heavy 120mm Brandt Mortars were as follows:

	<u>Light</u>	<u>Heavy</u>
No. Hits in total polar zone 50° - 140°	873	1340
Median Fragment Velocity (ft/sec) in polar zone 80° - 110°	3930	4900
No. Head Fragments in weight Groups:		
5/8 - 2 1/2 grams	768	1236
2 1/2 - 10 grams	564	715
10 - 40 grams	237	188
40 - 160 grams	7	29

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**Static Fragmentation of Brandt 120mm Mortar Ammunition**

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**U. S. NAVAL PROVING GROUND  
DAULGREN, VIRGINIA**

**Eighteenth Partial Report**

**on**

**Fragmentation of Projectiles and Warheads**

**Final Report**

**on**

**Static Fragmentation of  
Brandt 120mm Mortar Ammunition**

**JUN 7 1955**

**55AA 21153**

**Project No.: NPG-Re2c-35-1-52  
Copy No.: 9  
No. of Pages: 8**

**Date: MAY 6 1952**

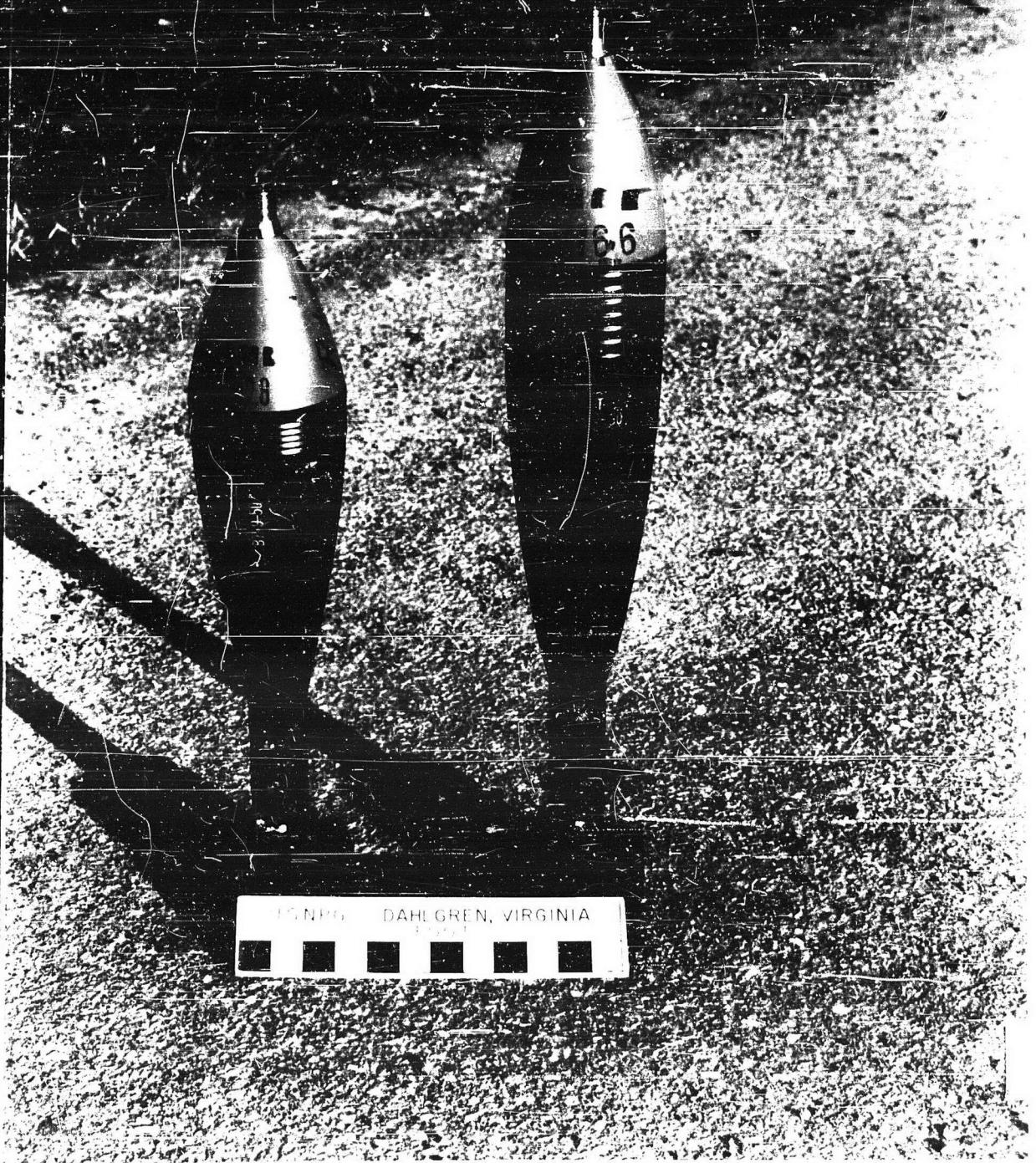
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8 JANUARY 1952

NFO-4 78549

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Flight and Heavy Brandt 120mm Mortar Ammunition.

Figure 1



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NP&-47541

1. Bursting Charge
2. Core.

8 JANUARY 1952

Sectioned View of Light Brandt 120mm Mortar.

3. Shell Body  
4. Booster Cup

5. Booster Charge  
6. Fuze Well Cup

Figure 2

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7. Adapter



1  
2  
3  
4  
5  
6  
7

NP9-47542

28 JANUARY 1952

Sectioned View of Heavy Brassard 120mm Mortar.  
1. Bursting Charge  
2. Core  
3. Shell Body  
4. Booster Surround  
5. Booster Charge  
6. Fuze Well Cup  
7. Nose Charter  
8. Figure 3

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Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE I

SPACE DISTRIBUTION DATA

30' Radius Space Arena  
1/8" MS panels 5" high  
120mm Light Brandt Mortars

8 January 1952

Zone, <u>Degrees</u>	Rd. <u>1</u>	Rd. <u>2</u>	Rd. <u>3</u>	Rd. <u>4</u>	Rd. <u>5</u>	Rd. <u>6</u>	Rd. <u>7</u>	Rd. <u>8</u>	Rd. <u>9</u>
0-5	.5	.5		.5			.5		
5-10									
10-15									
15-20									
20-25									
25-30									
30-35								1	1
35-40									
40-45									
45-50									
50-55									
55-60	1	1		1	1	1	1	1	2
60-65	3		1	1	3	1		2	1
65-70	1	2	1		1			1	1
70-75	3	1	1	1			1	1	1
75-80	1	3					1		1
80-85	1	1	1		1		2	2	1
85-90		4			2			5	3
90-95	4	1	6	3	4	8	2	4	3
95-100	3	4	7	4	5	2	4	3	3
100-105	5	6	6	5	5	5	4	3	9
105-110	4	3	3	4	5	2	7	1	4
110-115			1		1				1
115-120				1	2	1			
120-125					1	1			
125-130			1				1		1
130-135			1				1	1	
135-140									
140-145									
145-150									
150-155									
155-160									
160-165									
165-170									
170-175									
175-180									

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE I (Continued)SPACE DISTRIBUTION DATA

30' Radius Space Arena  
 1/8" MS panels 5" high  
 120mm Light Brandt Mortars

8 January 1952

<u>Zone, Degrees</u>	<u>Average Impacts Per 5° Zone on Panel</u>	<u>Average Impacts Per Total 5° Zone</u>	<u>Average Impacts Per Unit Solid Angle</u>
0-5	0.2	.4	17
5-10			
10-15			
15-20			
20-25			
25-30			
30-35	0.2	4	14
35-40			
40-45			
45-50			
50-55	0.1	3	7
55-60	0.8	25	60
60-65	1.3	44	89
65-70	0.9	30	60
70-75	0.9	30	60
75-80	0.8	30	60
80-85	0.7	30	50
85-90	1	40	70
90-95	4	150	300
95-100	3.2	119	220
100-105	5.1	188	350
105-110	3.7	133	250
110-115	0.4	13	30
115-120	0.4	13	30
120-125	0.2	6	14
125-130	0.4	11	30
130-135	0.3	8	20
135-140			
140-145			
145-150			
150-155			
155-160			
160-165			
165-170			
170-175			
175-180			

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**Static Fragmentation of Brandt 120mm Mortar Ammunition**

**TABLE II**

**SPACE DISTRIBUTION DATA**

**30' Radius Space Arena  
1/8" MS panels 5" high  
120mm heavy Brandt Mortars**

**8 January 1952**

<b>Zone, Degrees</b>	<b>Rd. 1</b>	<b>Rd. 2</b>	<b>Rd. 3</b>	<b>Rd. 4</b>	<b>Rd. 5</b>	<b>Rd. 6</b>	<b>Rd. 7</b>	<b>Rd. 8</b>	<b>Rd. 9</b>
0-5	.5	.5			.5	.5		.5	.5
5-10									
10-15									
15-20			1	1					
20-25	1								
25-30									
30-35									
35-40				1					
40-45									
45-50									
50-55									
55-60									
60-65	1		1	1	1		4	2	
65-70	2		2	1	3	3	3	3	2
70-75	1		2	2	1	2	2	2	
75-80			1	1	4	1			
80-85			1	2	3	8			
85-90	1		1	4					
90-95	7		3	1	3	3	3	2	6
95-100	11		4	5	4	7	9	6	9
100-105	2		8	7	6	6	6	7	6
105-110	6		10	9	9	6	7	7	9
110-115	4		2	2	2	3	1	1	1
115-120									
120-125	1		1		1				
125-130									
130-135					1				
135-140	1		1						
140-145									
145-150									
150-155									
155-160									
160-165									
165-170									
170-175									
175-180									

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE II (Continued)SPACE DISTRIBUTION DATA

30' Radius Space Arena  
 1/8" MS panels 5" high  
 120mm Heavy Brandt Mortars

8 January 1952

<u>Zone, Degrees</u>	<u>Average Impacts Per 5° Zone on Panel</u>	<u>Average Impacts Per Total 5° Zone</u>	<u>Average Impacts Per Unit Solid Angle</u>
0-5	0.3	.6	30
5-10			
10-15			
15-20	0.2	2	13
20-25	0.2	3	13
25-30			
30-35			
35-40	0.1	2	7
40-45			
45-50			
50-55			
55-60	0.1	3	7
60-65	1	30	70
65-70	2	70	140
70-75	2	70	140
75-80	1	40	70
80-85	1.6	60	110
85-90	0.6	20	40
90-95	3.4	128	230
95-100	6.8	250	470
100-105	7.2	270	500
105-110	7.7	280	530
110-115	1.9	66	130
115-120	0.9	30	60
120-125	0.4	12	30
125-130	0.1	3	7
130-135	0.1	3	7
135-140	0.2	5	13
140-145			
145-150			
150-155			
155-160			
160-165			
165-170			
170-175			
175-180			

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Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE III

FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3270 frames per sec.  
Rd. 1, Light 120mm                            TNT Filler  
Total Weight 28.34 Lbs.                        Filler Weight 5.95 Lbs.

<u>Frame in which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
21	5	4670
22	5	4460
23	12	4270
24	4	4090
25	5	3920
26	9	3770
27	7	3630
28	3	3500
29	4	3380
30	7	3270
31	5	3160
33	2	2970
Median		3900
Average		3840

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE III (Continued)FRAGMENT VELOCITY DATA

35mm Fastax Camera	3270 frames per sec.	
Rd. 2, Light 120mm	TNT Filler	
Total Weight 28.44 Lbs.	Filler Weight 5.95 Lbs.	
<u>Frame in which hit occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
21	3	4670
22	7	4460
23	14	4270
24	9	4090
25	7	3920
26	9	3770
27	8	3630
28	8	3500
29	7	3380
30	5	3270
31	3	3160
33	1	2970
Median		3950
Average		3860

## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE III (Continued)FRAGMENT VELOCITY DATA

35mm Fastax Camera

3240 frames per sec.

Rd. 3, Light 120mm

TNT Filler

Total weight 28.23 Lbs.

Filler weight 5.95 Lbs.

Frame in Which  
Hit OccurredNo. FragmentsVelocity (f/s)

22	13	4420
23	9	4230
24	7	4050
25	6	3890
26	7	3740
27	8	3600
28	14	3470
29	6	3350
30	5	3240
31	1	3140
32	1	3040
Median		3800
Average		3810

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Static Fragmentation of Brandt 120mm Mortar Ammunition

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TABLE III (Continued)

FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3210 frames per sec.  
Rd. 4, Light 120mm                            TNT Filler  
Total Weight 28.24 Lbs.                        Filler Weight 5.95 Lbs.

<u>Frame in Which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
20	1	4820
21	15	4590
22	10	4380
23	7	4190
24	12	4010
25	12	3850
26	14	3700
27	11	3570
28	9	3440
29	4	3320
31	1	3110
Median		4010
Average		3950

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE III (Continued)FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3090 frames per sec.  
 Rd. 5, Light 120mm                            TNT Filler  
 Total Weight 28.28 Lbs.                      Filler Weight 5.95 Lbs.

<u>Frame in which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
20	5	4640
21	10	4410
22	13	4210
23	14	4030
24	8	3860
25	10	3710
26	11	3570
27	15	3430
28	8	3310
29	1	3200
30	2	3090
Median		3950
Average		3850

## Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE III (Continued)FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3125 frames per sec.  
 Rd. 6, Light 120mm                            TNT Filler  
 Total Weight 28.27 Lbs.                      Filler Weight 5.95 Lbs.

<u>Frame in Which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
21	5	4460
22	13	4260
23	9	4080
24	8	3910
25	11	3750
26	12	3610
27	6	3470
28	13	3350
29	7	3230
30	6	3130
Median		3940
Average		3730

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TABLE IV

FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3225 frames per sec.  
Rd. 1, Heavy 120mm                            TNT Filler  
Total Weight 36.91 Lbs.                        Filler Weight 9.71 Lbs.

<u>Frame in which hit occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
17	1	5690
18	6	5380
19	23	5090
20	38	4840
21	23	4610
22	12	4400
23	4	4210
Median		4920
Average		4810

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Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE IV (Continued)

FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3240 frames per sec.  
Rd. 2, Heavy 120mm                            TNT Filler  
Total Weight 37.49 Lbs.                        Filler Weight 9.71 Lbs.

<u>Frame in which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
18	15	5400
19	21	5120
20	26	4860
21	25	4630
22	18	4420
23	8	4230
24	4	4050
25	2	3890
Median		4900
Average		4770

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**Static Fragmentation of Brandt 120mm Mortar Ammunition**  
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**TABLE IV (Continued)**

**FRAGMENT VELOCITY DATA**

35mm Fastax Camera	3240 frames per sec.	
Rd. 3, Heavy 120mm	TNT Filler	
Total Weight 37.18 Lbs.	Filler Weight 9.71 Lbs.	
<hr/>		
<u>Frame in which hit occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
16	1	6080
17	1	5720
18	9	5400
19	30	5120
20	34	4860
21	10	4630
22	6	4420
23	1	4230
24	3	4050
Median		5050
Average		4930

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Static Fragmentation of Brandt 120mm Mortar Ammunition

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TABLE IV (Continued)

FRAGMENT VELOCITY DATA

35mm Fastax Camera		3240 frames per sec.
Rd. 4, Heavy 120mm		TNT Filler
Total Weight 36.68 Lbs.		Filler Weight 9.71 Lbs.
<u>Frame in Which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
18	6	5400
19	18	5120
20	27	4860
21	24	4630
22	12	4420
23	5	4230
24	2	4050
25	2	3890
26	1	3740
27	3	3600
Median		4860
Average		4720

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NPG REPORT NO. 968

Static Fragmentation of Brandt 120mm Mortar Ammunition

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TABLE IV (Continued)

FRAGMENT VELOCITY DATA

35mm Fastax Camera	3210 frames per sec.	
Rd. 5, Heavy 120mm	TNT Filler	
Total Weight 37.20 Lbs.	Filler weight 9.71 Lbs.	
Frame in which Hit Occurred	No. Fragments	
18	17	5350
19	12	5070
20	18	4820
21	31	4590
22	11	4380
23	2	4190
Median		4940
Average		4810

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NPG REPORT NO. 968

Static Fragmentation of Brandt 120mm Mortar Ammunition

TABLE IV (Continued)

FRAGMENT VELOCITY DATA

35mm Fastax Camera                            3240 frames per sec.  
Rd. 6, Heavy 120mm                            TNT Filler  
Total weight 37.33 Lbs.                        Filler weight 9.71 Lbs.

<u>Frame in Which Hit Occurred</u>	<u>No. Fragments</u>	<u>Velocity (f/s)</u>
19	8	5120
20	25	4860
21	28	4630
22	17	4420
23	8	4230
24	2	4050
Median		4750
Average		4650

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## Static Fragmentation of Brandt 120mm Mortar Ammunition

MPC REPORT NO. 968

TABLE A

MASS DISTRIBUTION DATA

FRAGMENTATION OF LIGHT 120mm BRANDT MORTAR:  
NUMBER AND WEIGHT OF RECOVERED FRAGMENTS

NUMBER AND WEIGHT OF RECOVERED FRAGMENTS											NUMBER AND WEIGHT OF RECOVERED FRAGMENTS												
	Comp.	Piller	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.	Grms.										
PCD.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.	Wt.		
No.	1b.	1b.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.										
<u>HEAD</u>																							
1	28.29	5.95	564	418	485	722	412	1159	329	1581	236	2261	163	1754	70	83	2	--	217	90	8792	1787	48314
2	28.65	5.95	461	392	472	668	289	1129	325	1555	235	2298	168	2097	79	315	7	--	187	82	9102	1757	48518
3	28.33	5.95	367	273	324	605	354	1154	320	2052	293	2090	152	1687	62	247	9	--	223	88	8703	1602	48540
4	28.35	5.95	382	320	365	574	327	1C13	284	1584	226	2458	182	1824	67	294	13	--	154	127	8903	1591	48644
5	28.31	5.95	374	323	387	555	323	1100	308	1809	263	2209	164	2027	77	290	6	--	207	107	8897	1635	48645
<u>TAIL</u>																							
1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1247	10 48314	
2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1247	10 48518	
3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1243	6 48540	
4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1232	8 48644	
5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1232	9 48645	
<u>AVERAGE HEAD</u>																							
28.39	--	430	347	407	625	361	1111	313	1716	251	2263	166	1878	71	306	7.4	--	--	198	99	8873	1674	--
<u>AVERAGE TAIL</u>																							
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1220	9 --	

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## APPENDIX D

TABLE VI

WBS DISTRIBUTION PTM

PRIMING OF HEAVY 120mm BRANDT PORTAR.

FORTALION

APPENDIX D

TABLE VI

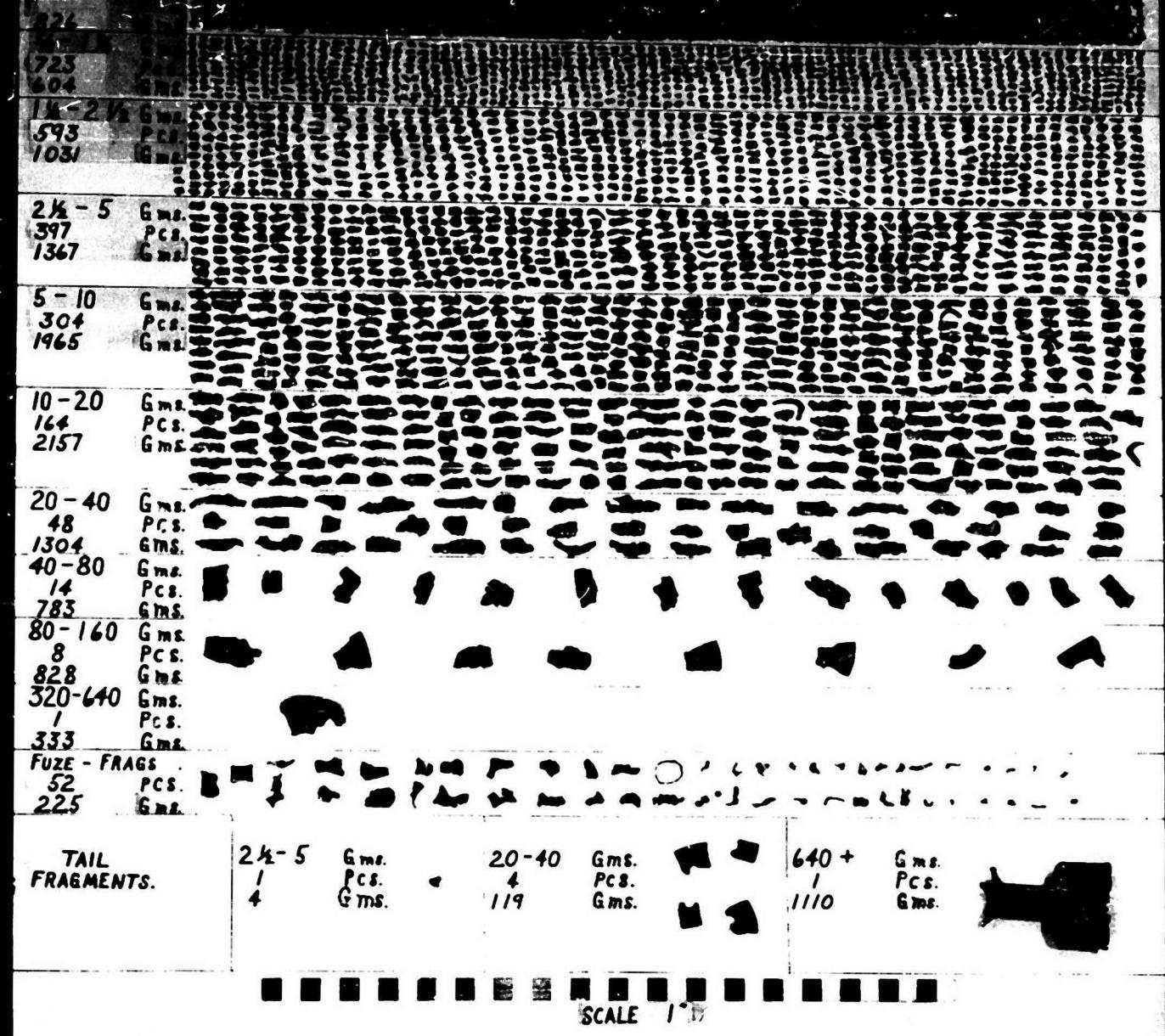
WAGE DISPARITIES DATA

**FRAGMENTATION OF HEAVY 120-mm BRANDT MORTARS:  
NUMBER AND WEIGHT OF RECOVERED FRAGMENTS**

SECURITY IMPORTATION  
COOPERATIVE

APPENDIX D

## APPENDIX D



NPS-47291

9 JANUARY 1962

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SECURITY INFORMATION

Round No. 1, Mass Distribution of Heavy 120mm Mortar.

Figure 4

1345

5 - 10  
287  
340

11 - 20  
118  
1583

20 - 40

49

1403

40 - 80

23

1282

80 - 160

8

276

160 - 320

1

171

FUZE - FRAGS

46

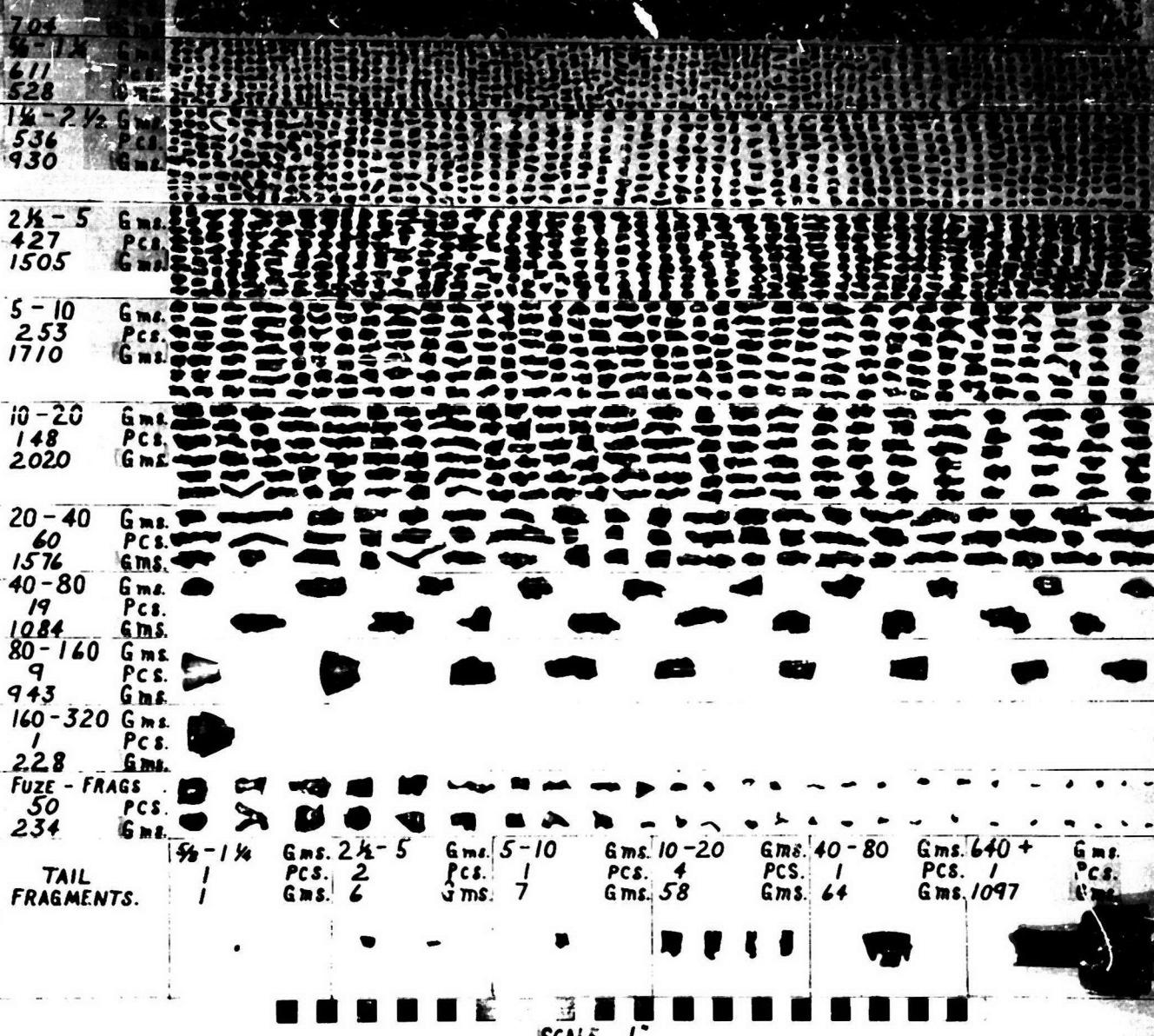
218

TAIL  
FRAGMENTS.

10 - 20  
2  
20  
Gms.  
Pcs.  
Gms.

40 - 80  
2  
1/3  
Gms.  
Pcs.  
Gms.

640 +  
1  
1093  
Gms.  
Pcs.  
Gms.



SCALE 1"

NP9-47481

17 JANUARY 1952

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Round No. 3, Mass Distribution of Heavy 120mm Brandt Mortar.

Figure 6

595  
1026

22-5  
1404  
1425

5-10  
263  
1838

10-20  
128  
1773

20-40  
35  
1016

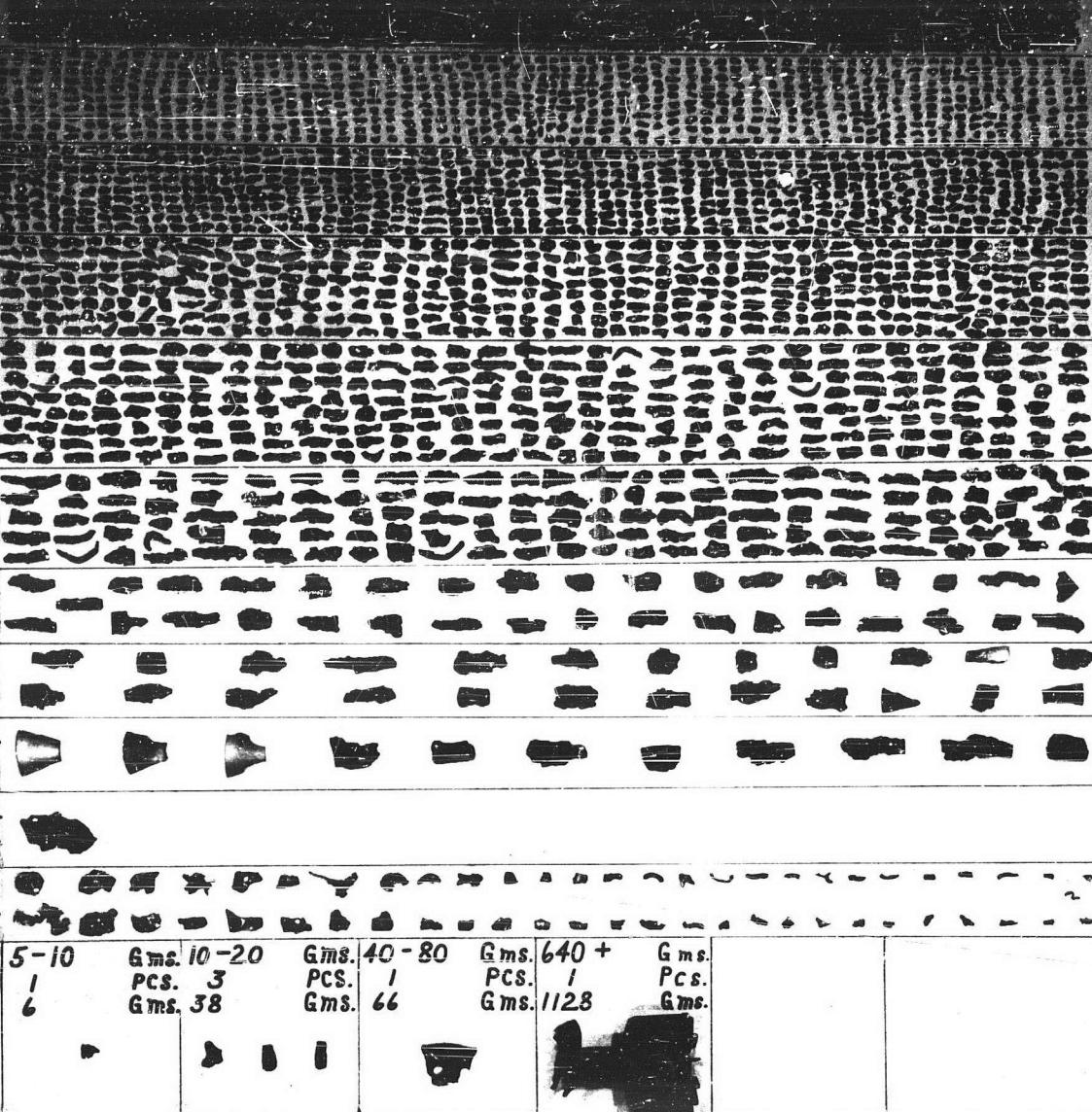
40-80  
24  
1221

80-160  
11  
1133

160-320  
1  
204

FUZE - FRAGS  
55  
236

TAIL  
FRAGMENTS.



NPC-4753

1 JANUARY 1952

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SECURITY INFORMATION

Round 11. 7, Class Distribution of Heavy 120mm Brandt Mortar.  
Figure 7

FRAG NO 1629

N.P.T. 47570

1 - 1/2 Gms.

721 Gms.

62 - 1/4 Gms.

581 Gms.

511 Gms.

1 1/2 - 2 1/2 Gms.

596 Gms.

1040 Gms.

2 1/2 - 5 Gms.

483 Gms.

1660 Gms.

5 - 10 Gms.

314 Gms.

2072 Gms.

10 - 20 Gms.

149 Gms.

1975 Gms.

20 - 40 Gms.

41 Gms.

1034 Gms.

40 - 80 Gms.

22 Gms.

1170 Gms.

80 - 160 Gms.

7 Gms.

736 Gms.

160 - 320 Gms.

1 Gms.

167 Gms.

FUZE - FRAGS .

58 Gms.

234 Gms.

FRAG NO. 1630

N.P.9 48314

0 - 2 Gms.  
564 Pcs.5/8 - 1 1/2 Gms.  
485 Pcs.  
418 Gms.1 1/2 - 2 1/2 Gms.  
412 Pcs.  
722 Gms.2 1/2 - 5 Gms.  
329 Pcs.  
1159 Gms.5 - 10 Gms.  
236 Pcs.  
1581 Gms.10 - 20 Gms.  
163 Pcs.  
2261 Gms.20 - 40 Gms.  
70 Pcs.  
1754 Gms.40 - 80 Gms.  
2 Pcs.  
83 Gms.FUZE - FRAGS  
90 Pcs.  
217 Gms.TAIL  
FRAGMENTS.

1 1/2 - 2 1/2	Gms.	-	5 - 10	Gms.	20 - 40	Gms.	640 +	Gms.
2	Pcs.		1	Pcs.	2	Pcs.	1	Pcs.
3	Gms.		6	Gms.	58	Gms.	1019	Gms.
2 1/2 - 5	Gms.		10 - 20	Gms.	40 - 80	Gms.		
2	Pcs.		1	Pcs.	1	Pcs.		
7	Gms.		12	Gms.	42	Gms.		

SCALE 1"

FRAG NO 1631

0 - 5	Gms.
	PCs.
461	Gms.

5 $\frac{1}{2}$ - 1 $\frac{1}{2}$	Gms.
472	PCs.
392	Gms.

1 $\frac{1}{2}$ - 2 $\frac{1}{2}$	Gms.
389	PCs.
668	Gms.

2 $\frac{1}{2}$ - 5	Gms.
325	PCs.
1129	Gms.

5 - 10	Gms.
235	PCs.
1555	Gms.

10 - 20	Gms.
168	PCs.
2298	Gms.

20 - 40	Gms.
79	PCs.
2097	Gms.

40 - 80	Gms.
7	PCs.
315	Gms.

FUZE - FR:GS	Gms.
82	PCs.
187	Gms.

TAIL  
FRAGMENTS.

1 $\frac{1}{2}$ - 2 $\frac{1}{2}$	Gms.	5 - 10	Gms.	20 - 40	Gms.	640 +	Gms.
1	PCs.	2	PCs.	3	PCs.	1	PCs.
2	Gms.	12	Gms.	75	Gms.	1131	Gms.

2 $\frac{1}{2}$ - 5	Gms.
1	PCs.
3	Gms.

10 - 20	Gms.
2	PCs.
24	Gms.

SCALE 1"

11448518

Mass distribution analysis of tail fragments.

## FRAG NO. 1632

0 -  $\frac{1}{2}$  Gms.  
367 Pcs.  
Gms.

$\frac{1}{2}$  -  $\frac{1}{4}$  Gms.  
324 Pcs.  
278 Gms.

$\frac{1}{4}$  -  $\frac{1}{2}$  Gms.  
354 Pcs.  
605 Gms.

$\frac{1}{2}$  - 5 Gms.  
320 Pcs.  
1154 Gms.

5 - 10 Gms.  
293 Pcs.  
2052 Gms.

10 - 20 Gms.  
152 Pcs.  
2090 Gms.

20 - 40 Gms.  
62 Pcs.  
1687 Gms.

40 - 80 Gms.  
9 Pcs.  
247 Gms.

FUZE - FRAGS  
88 Pcs.  
223 Gms.

TAIL  
FRAGMENTS.

5 - 10 Gms.  
1 Pcs.  
0 Gms.

10 - 20 Gms.  
1 Pcs.  
11 Gms.

20 - 40 Gms.  
3 Pcs.  
94 Gms.

640 + Gms.  
1 Pcs.  
1129 Gms.

SCALE 1"

EX-14854

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Round 1: 3, Mass Distribution of Light 120mm Brandt Mortar.

Figure 11

## FRAG NO 1636

N.P9 48644

0 - 9	Gms.	PCS.	Gms.					
382	Gms.							
9 $\frac{1}{2}$ - 1 $\frac{1}{4}$	Gms.							
365	PCS.							
320	Gms.							
1 $\frac{1}{4}$ - 2 $\frac{1}{2}$	Gms.							
327	PCS.							
574	Gms.							
2 $\frac{1}{2}$ - 5	Gms.							
284	PCS.							
1013	Gms.							
5 - 10	Gms.							
226	PCS.							
1584	Gms.							
10 - 20	Gms.							
182	PCS.							
2458	Gms.							
20 - 40	Gms.							
67	PCS.							
1824	Gms.							
40 - 80	Gms.							
13	PCS.							
594	Gms.							
FUZE - FRAGS								
127	PCS.							
154	Gms.							
TAIL FRAGMENTS.	2 $\frac{1}{2}$ - 5	Gms.	10 - 20	Gms.	20 - 40	Gms.	640 +	Gms.
	1	PCS.	4	PCS.	2	PCS.	1	PCS.
	4	Gms.	47	Gms.	65	Gms.	1116	Gms.

SCALE 1"

N.P9-48644

13 FEBRUARY 1952

CONFIDENTIAL  
SECURITY INFORMATIONRound No. 4, Mass Distribution of Light 120mm Brandt Mortar.  
Figure 12

FRAG N 1637

0 - 5	Gms.
	PCS.
374	Gms.

5/8 - 1 1/4	Gms.
387	PCS.
328	Gms.

1 1/4 - 2 1/2	Gms.
323	PCS.
555	Gms.

2 1/2 - 5	Gms.
308	PCS.
1100	Gms.

5 - 10	Gms.
263	PCS.
1809	Gms.

10 - 20	Gms.
164	PCS.
2209	Gms.

20 - 40	Gms.
77	PCS.
2027	Gms.

40 - 80	Gms.
6	PCS.
290	Gms.

FUZE - FRAGS	
107	PCS.
205	Gms.

TAIL  
FRAGMENTS.

2 1/2 - 5	Gms.	5 - 10	Gms.	10 - 20	Gms.	20 - 40	Gms.	640 +	Gms.
2	PCS.	1	PCS.	3	PCS.	2	PCS.	1	PCS.
8	Gms.	7	Gms.	42	Gms.	53	Gms.	1122	Gms.

SCALE 1"

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**NPG REPORT NO. 968**

**Static Fragmentation of Brandt 120mm Mortar Ammunition**

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**APPENDIX E**